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SYNTHESIS AND CHEMICAL CHARACTERIZATION OF CYCLES FROM OXADIAZOL-INDOLE DERIVATIVES

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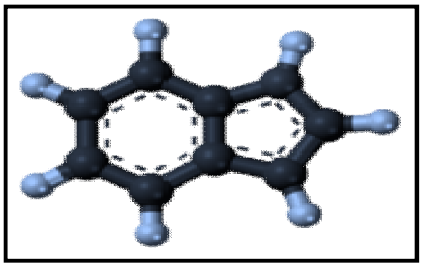
ABSTRACT

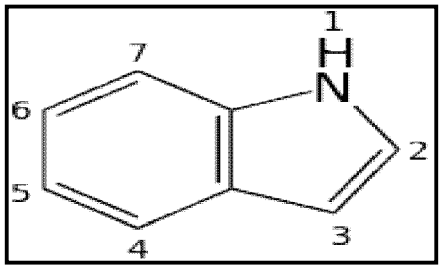
A novel series of indole ring bearing oxadiazole and other cycles have been synthesized using azo reaction as a starting material for preparation of different cycles with different atoms (nitrogen , sulfur , oxygen). Synthesized compounds were screened. All the synthesized compounds have been investigated using different chemical techniques, such as (^{1}H.NMR–spectra, FT.IR–spectra) some of them in ^{13}C.NMR–spectra , melting points.

Keywords: Indo, Bendol, Oxine

INTRODUCTION

Indole is one of important heterocyclic in organic chemistry. It has a bicyclic structure, containing of a six- atoms of carbon as a six ring with five ring of pyrrole cycle [1-3]

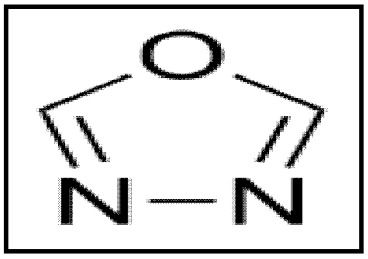




Indole ring chemistry starts to develop with the study of the dye indigo. Indigo can be converted to isatin and then to oxindole. Then, in 1866, Adolf von Baeyer converted oxindole ring to indole ring by zinc dust. Indole derivatives were important compounds until the end of the past centuries [4-6]. In the 1930s, interest in indole intensified when it became known that the indole substituent is present in many important molecules such as some drugs as anti microbial, anti cancer m, antioxidant , anti malaria[7-9].

Indole compound obtained from coal tar and indigo and produced by decompositi on of tryptophan in the intestine, where itcontributes to the peculiar odor of feces [(9--11)].

1,2,4-Oxadiazole, 1,2,5-oxadiazole, and 1,3,4-oxadiazole are known, but the 1,2,3-isomer is unstable and reverts to the diazoketone tautomer. The stable oxadiazoles appear in a variety of pharmaceutical drugs including raltegravir, butalamine, fasiplon, oxolami ne. Oxadiazole is derived from furan by substitution of two methylene groups with two pyridine type nitrogen. The 1,3,4-oxadiazole undergoes number of reactions including electrophilic substitution, nucleophilic substitution, thermal and photochemical reactions[(12-15)].



Oxadiazole which is a versatile heterocyclic nucleus, it has a wide attention of the medicinal chemists for development of new drugs

Experiment and Apparatuses

All chemicals used (purity 99.98%), FT.IR-spectra: were recorded on shimadzu 8300, KBr -disc, HNMR-spectra were recorded on varian 300MHz spectrometer using TMS as an internal standard and ^{13}C.NMR–spectra , were carried out in Department of chemistry in Canada. The melting points were determined in open capillary tubes by electro thermal 9300LTD, UK.

Synthesis of Compounds {1, 2}:

According to procedures[(4-7)] , (0.01mole) of 3- carboxy indol were refluxed for (3hrs) in presence of drops from absolute ethanol to produce precipitate of ester compounds[1] ,which (0.01mole) reacted with semicarbazide with refluxing for (4 hrs) in presence of ethanol, the precipitate were filtered and dried then re crystallized to yield compounds [2] .

Synthesis of Compounds {3, 4}:

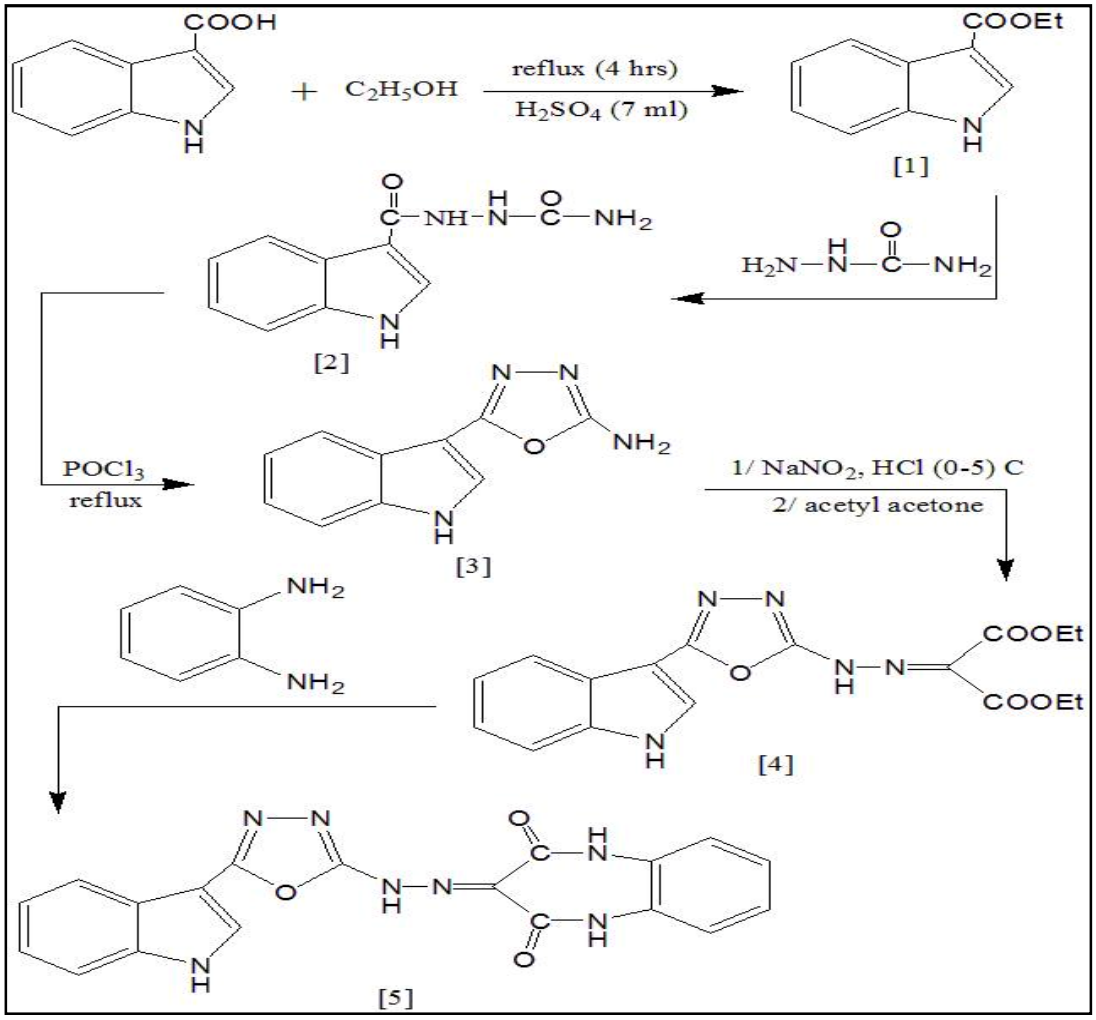
According to procedures[(4-78)] , (0.01mole) of compound [2] were refluxed for (2hrs) in presence of ($POCl_3$) to produce precipitate of indol - thiadiazol compounds [3] ,which (0.01mole) dissolved in (2ml)of hydrochloric acid then solution of sodium nitrite added , after that the solution of acetyl acetone was added to solution of mixture , the precipitate

were filtered and dried then re crystallized to yield compounds [4].

Synthesis of Compound {5}:

(0.01mole) of compound [4] refluxed for (5hrs) with (0.01mole) of o-phenylene di amine in presence of absolute ethanol to produce precipitate of cyclic compounds[5], the precipitate were filtered and dried then re crystallized to yield compounds [5], According to procedures[4-7] .

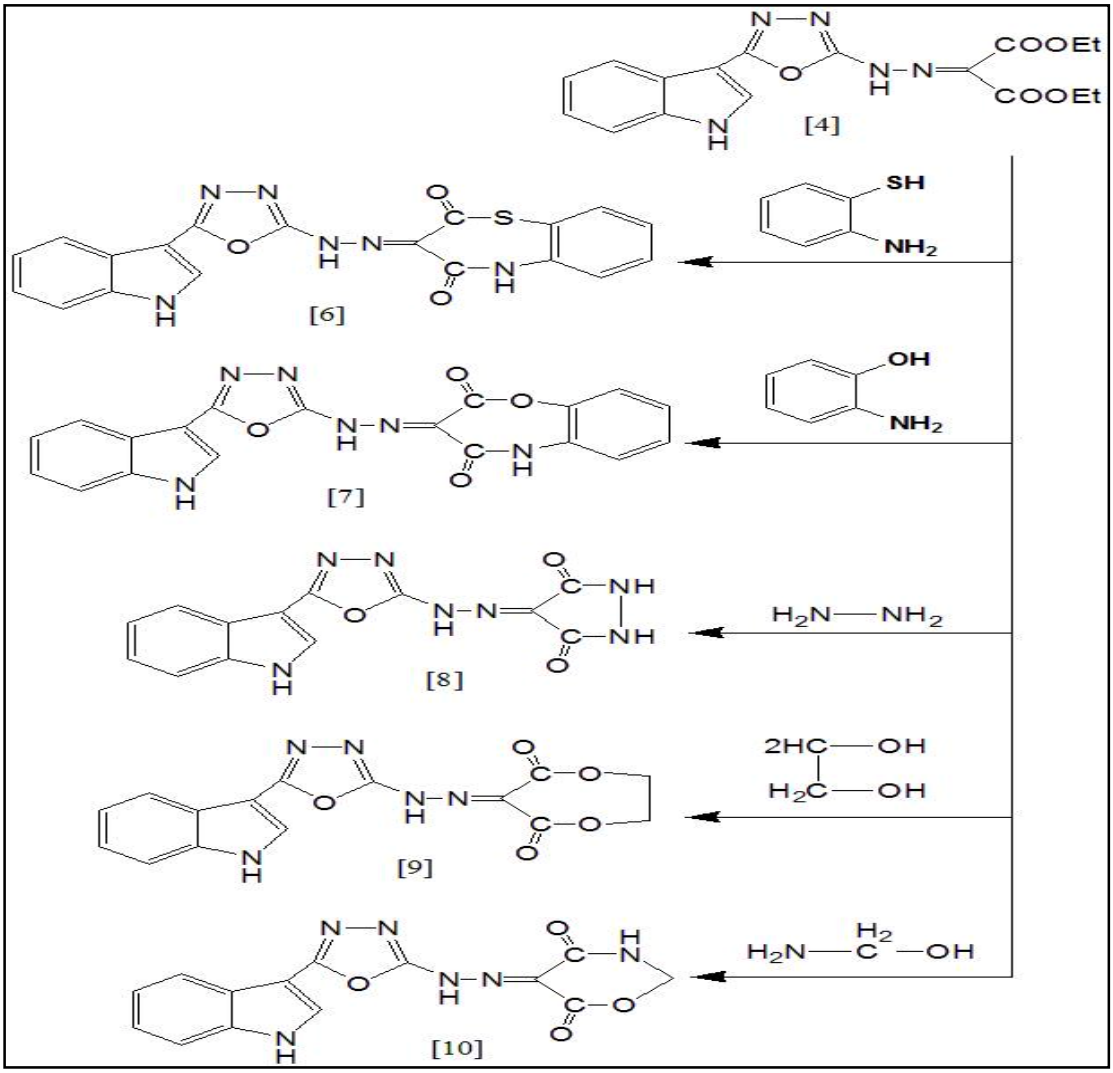
Scheme (1): Preparation of Compounds [1- 5]



Synthesis of Compounds {6 -10}:

According to procedures[4-7], ethanolic mixture of (0.01mole) of compound [4] with (0.01mole) from ((ortho thiol aniline, ortho hydroxy aniline , hydrazine , ethylene glygol , amino methanol)) respectively were refluxed for (6-7 hrs) in presence of ethanol to produce precipitate of cyclic compounds [6, 7, 8 , 9, 10] respectively ,the precipitates were filtered and dried then re crystallized to yield compounds [6, 7, 8 ,9, 10] respectively .

Scheme (2): Preparation of Compounds [6 - 10]



RESULTS AND DISCUSSION

All prepared compounds were characterized by [FT.IR-spectra, melting points, H.NMR- spectra and some of them by ^{13}C.NMR-spectra].

I.R-spectra :showed absorption band at (1730)cm^{-1} due to ester group (COO-Et) in compounds [1], which disappeared and other bands appeared such as (1670-1698) cm^{-1} due to amide group (-CO-N) , band (1445-1490) cm^{-1} to azo (-N=N-) group in compound , other bands (1625-1656) cm^{-1} to (-C=N-) endo cycle for oxadiazole cycle , bands at (3180- 3300) cm^{-1} to (-NH) group in indole ring and other bands in figures (1-10).

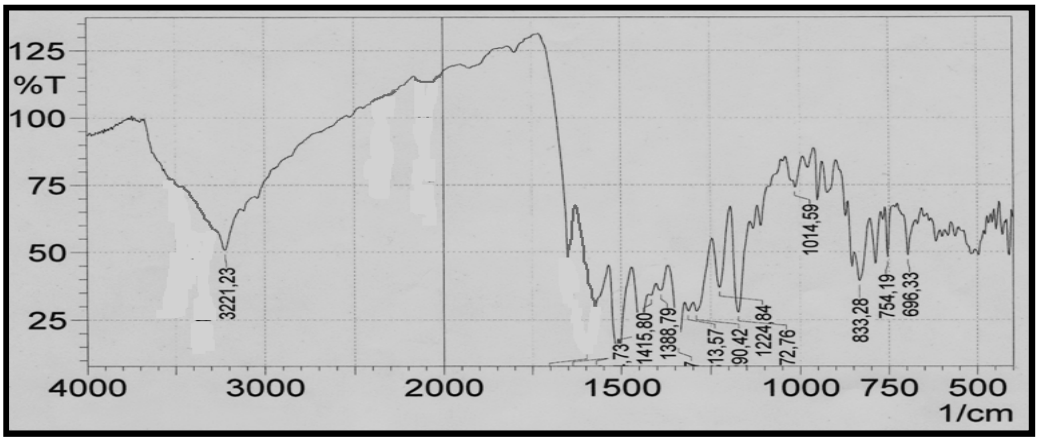


Fig.(1) FTIR Spectrum of the compound {1}

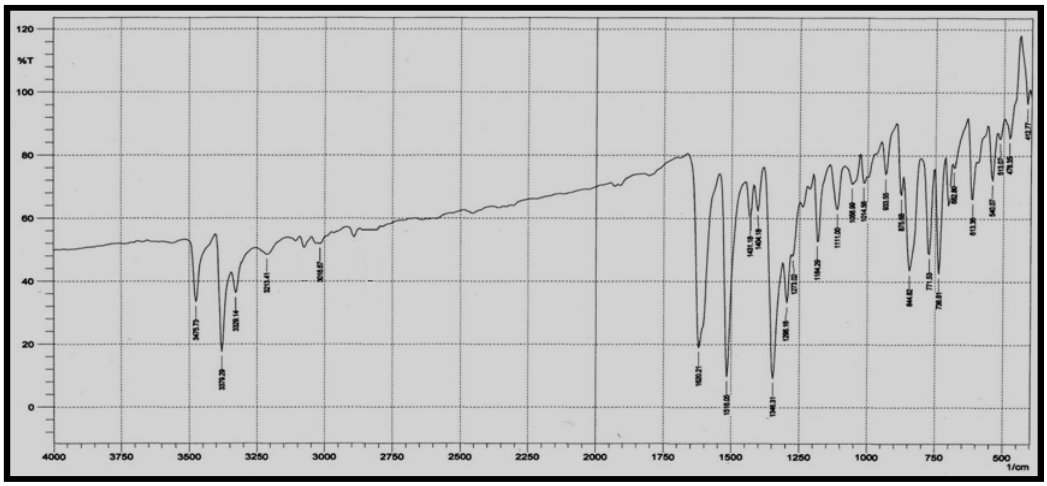


Fig.(2) FTIR Spectrum of the compound {2}

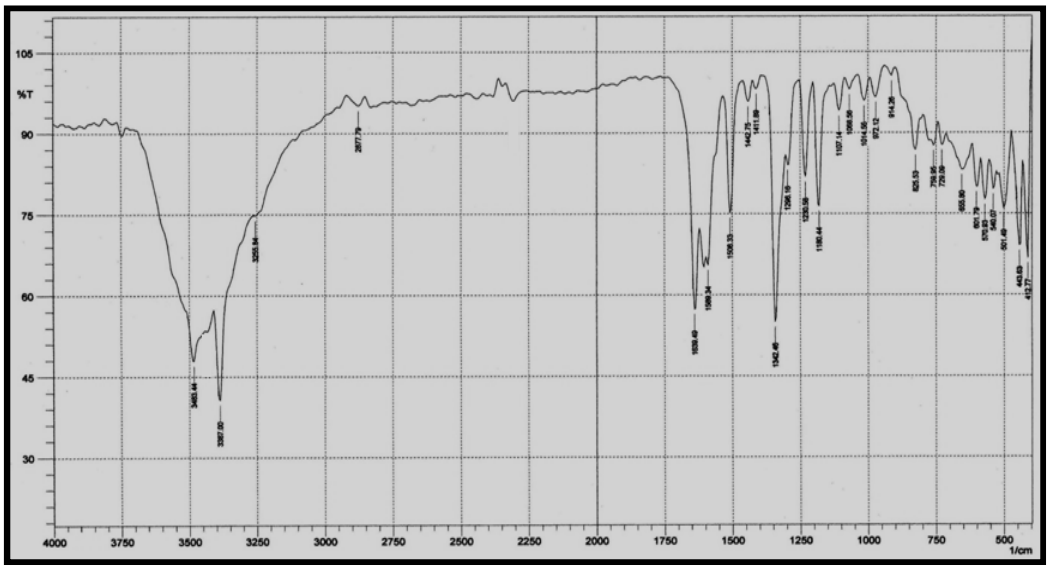


Fig.(3) FTIR Spectrum of the compound {3}

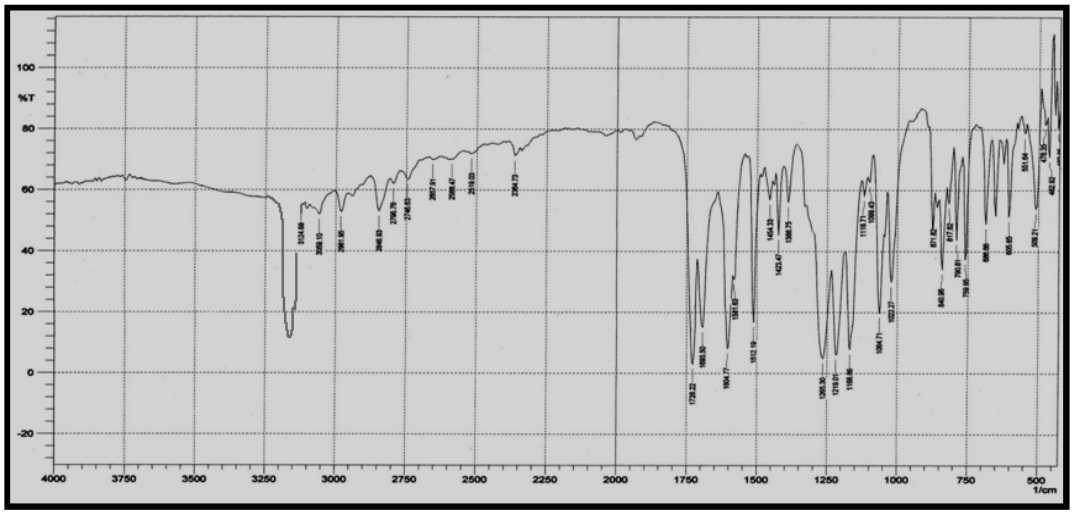


Fig.(4) FTIR Spectrum of the compound {4}

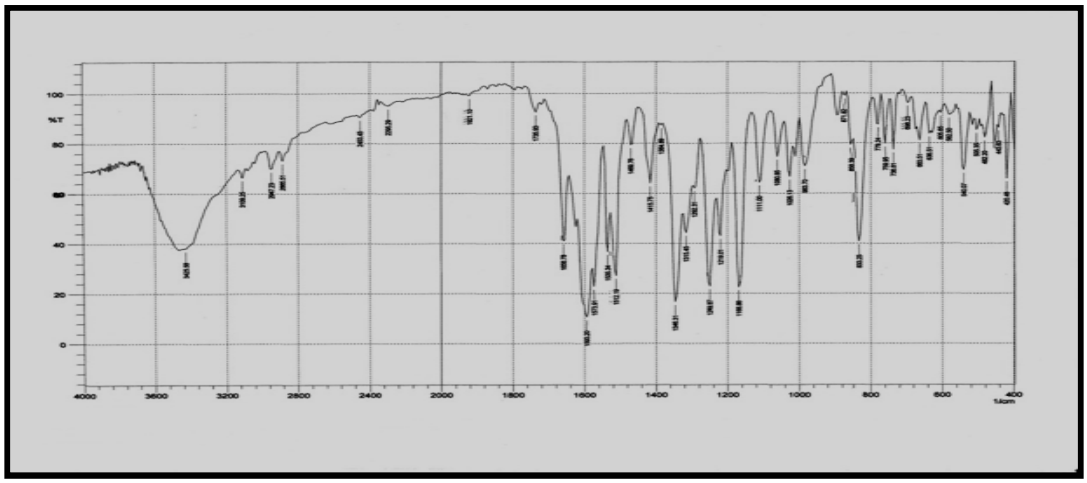


Fig.(5) FTIR Spectrum of the compound {5}

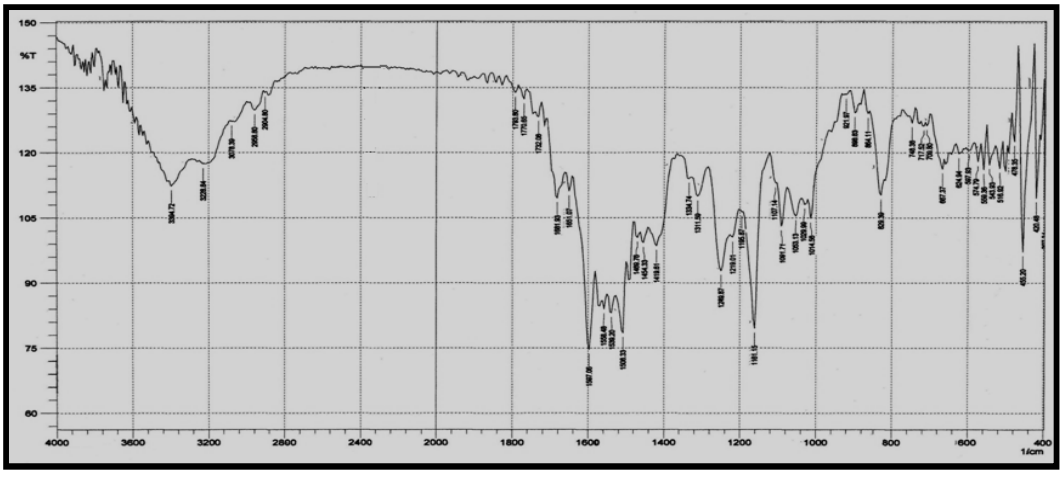


Fig.(6) FTIR Spectrum of the compound {6}

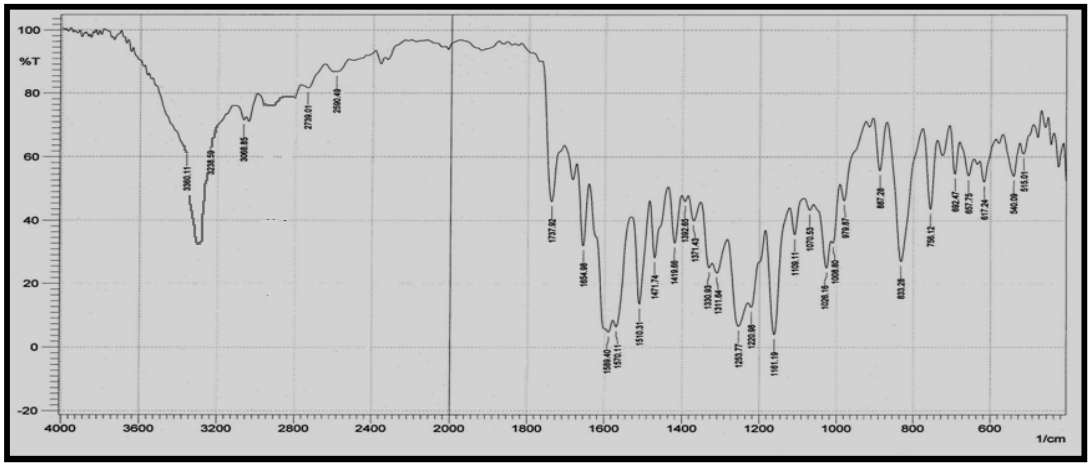


Fig.(7) FTIR Spectrum of the compound {7}

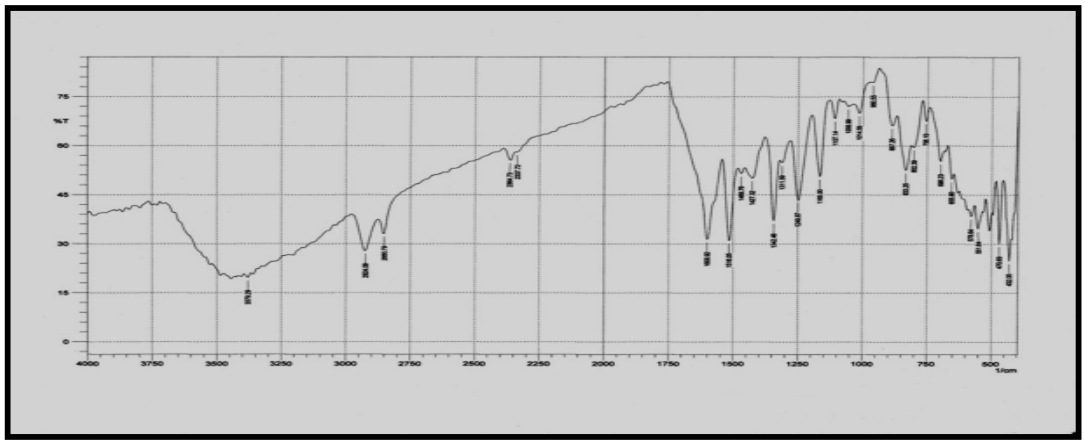


Fig.(8) FTIR Spectrum of the compound {8}

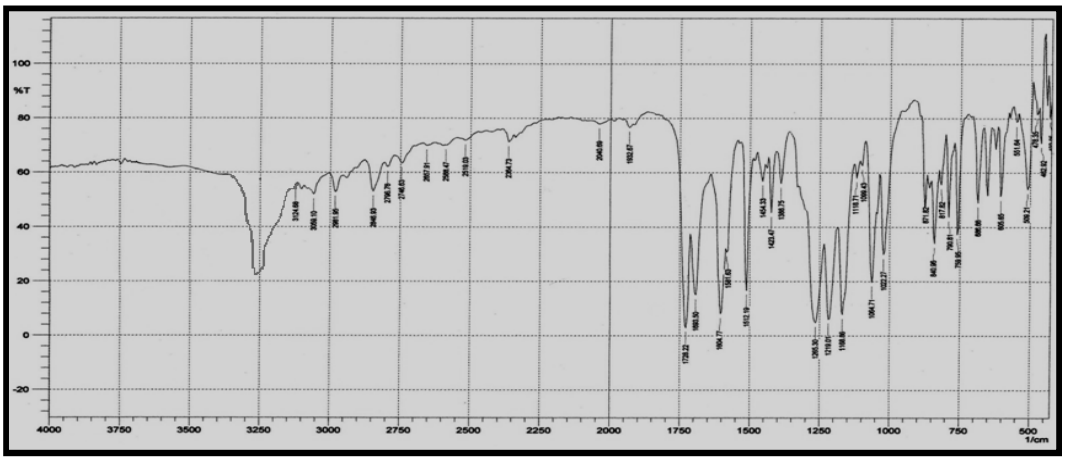


Fig.(9) FTIR Spectrum of the compound {9}

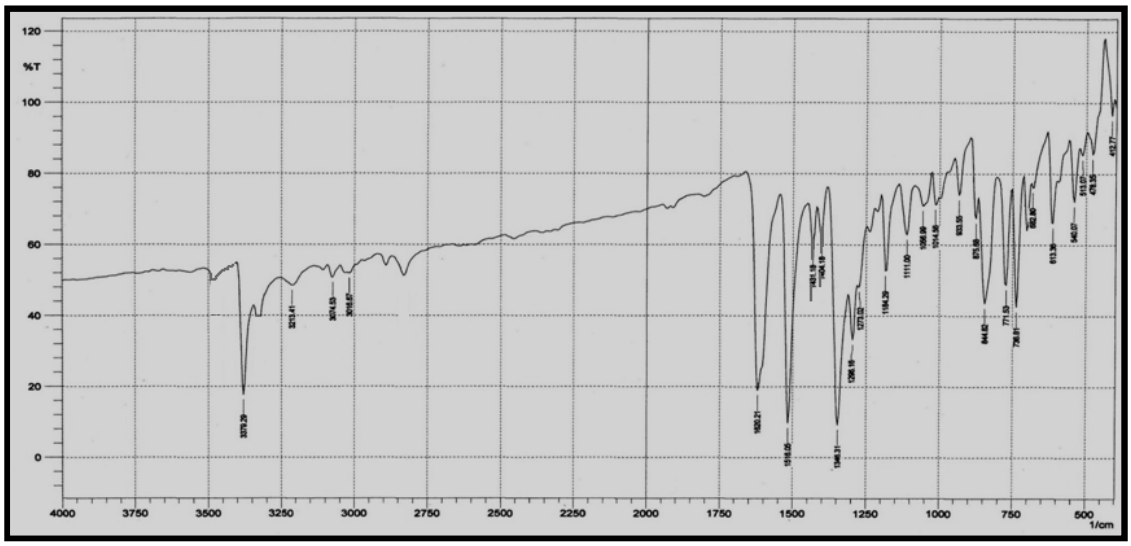


Fig.(10) FTIR Spectrum of the compound {10}

Physical Properties :some physical properties for all formatted compounds in this studying which indicated to cyclic compounds containing more than one hetero atoms from nitrogen, sulfur , oxygen, all properties in table (1).

Table (1): Physical properties of compounds [1-10]

Compounds	M.P C^{o}	Product %	R_f
[1]	148	78	0.66
[2]	162	70	084
[3]	176	85	0.82
[4]	172	70	0.74
[5]	190	84	0.84
[6]	208	85	0.88
[7]	212	86	0.88
[8]	222	78	0.78
[9]	230	74	0.76
[10]	134	86	0.80

The ^{1}H.NMR spectra: which appeared many peaks at б(3.10 – 4. 30) for protons of Ethyl of ester group in compound [1] ,which disappeared in new compounds to formation of cyclic compounds from five and seven member ring in prepared compounds[4-8] such as б(9.2 – 9. 80) to proton of amide , signal at б (8.10-8.95) to proton of amine in indole ring , and other signals in figures (11- 14).

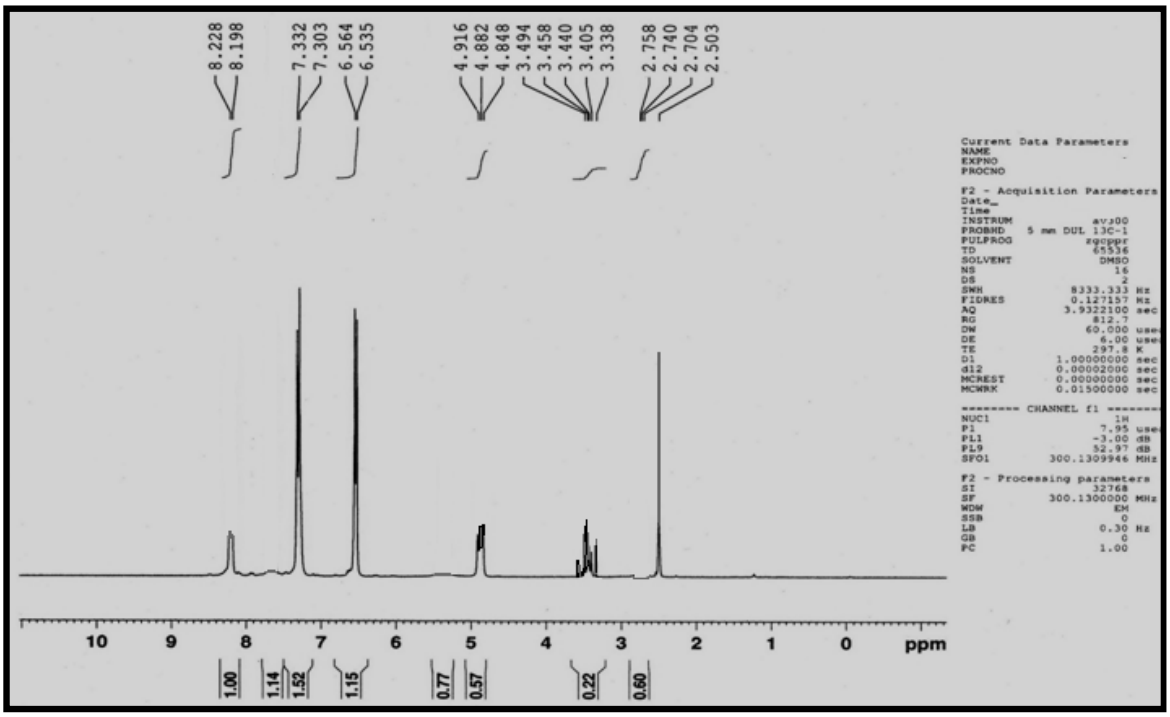


Fig (11): 1H.NMR of Compound [1]

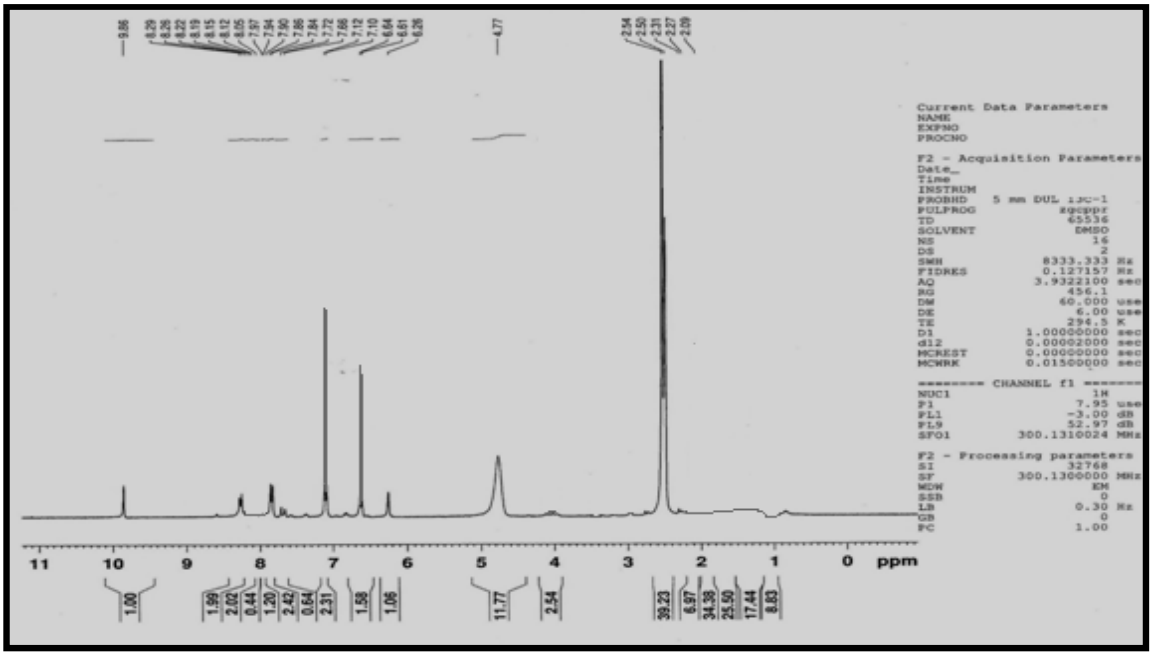


Fig (12): 1H.NMR of Compound [2]

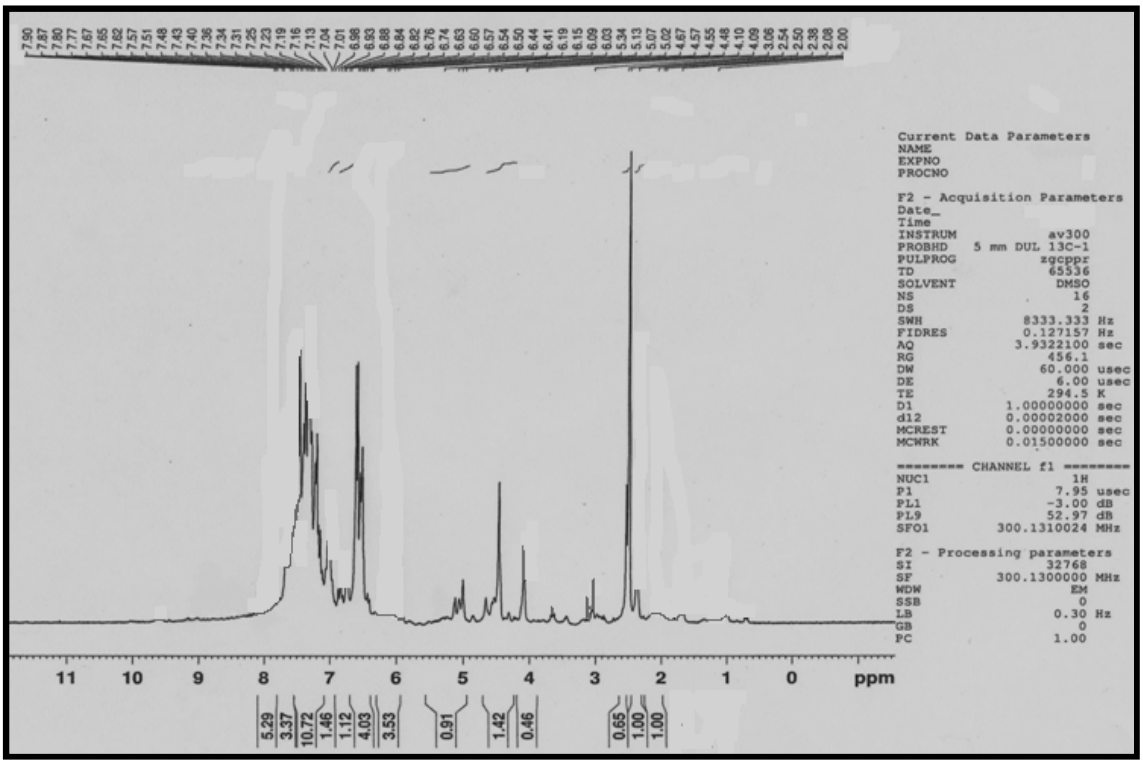


Fig (13): 1H.NMR of Compound [4]

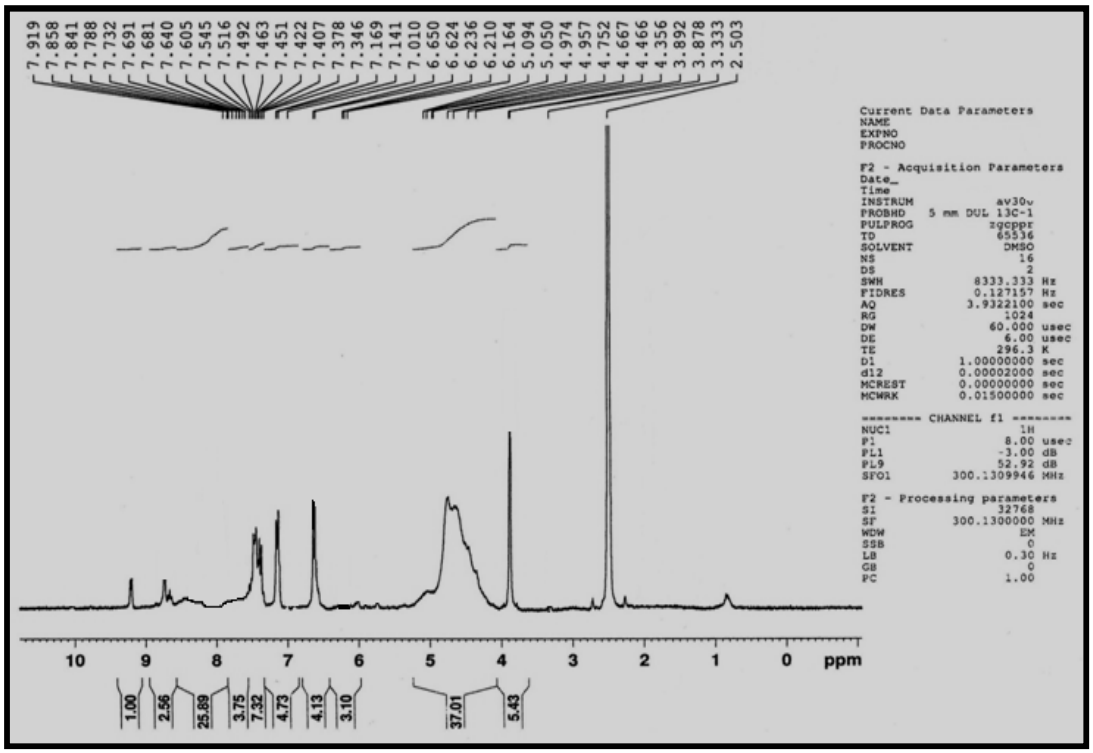


Fig (14): 1H.NMR of Compound [8]

The ^{13}C.NMR - spectra : the results of some compounds appeared signals indicated to functional groups[15 -18] in new compounds , figures (15- 17) :

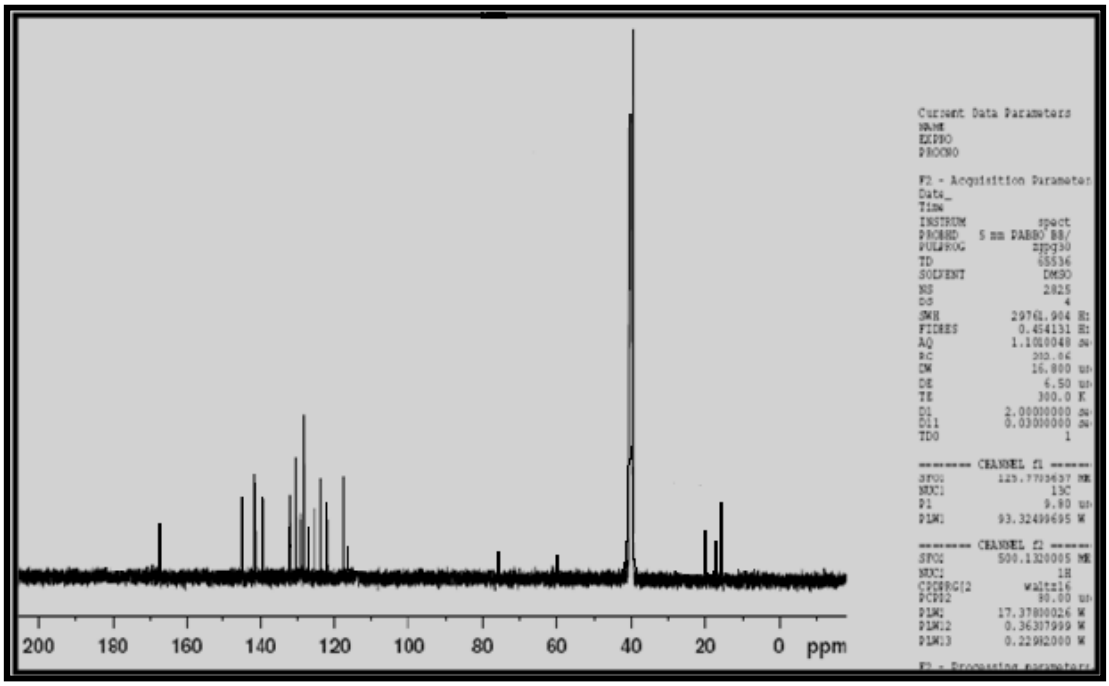


Fig (15): 13C.NMR of Compound [1]

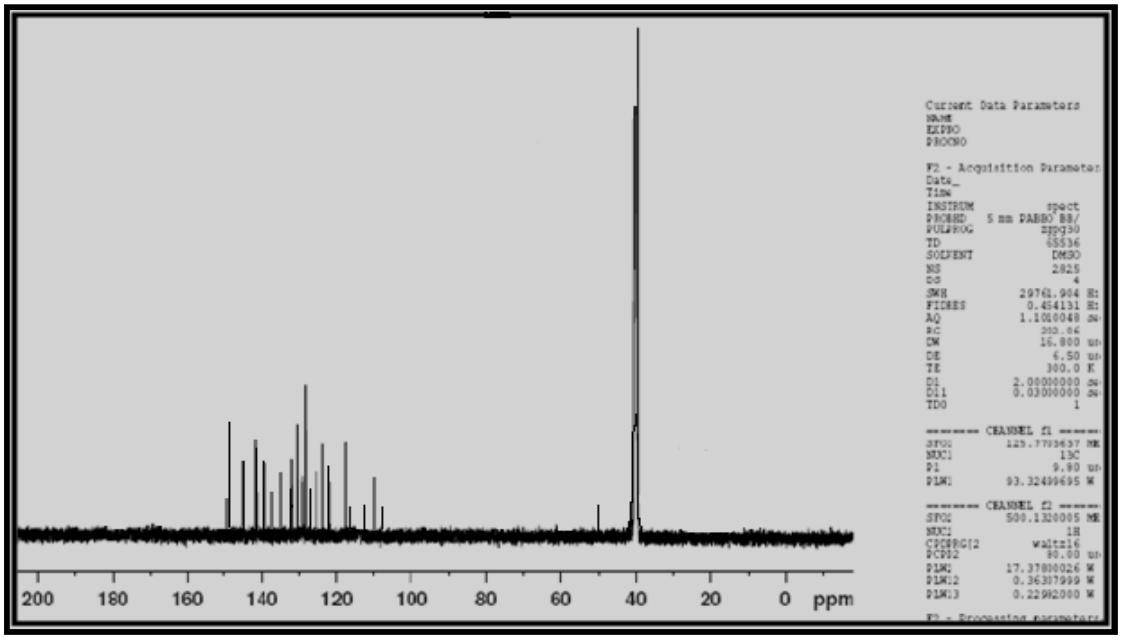


Fig (16): 13C.NMR of Compound [3]

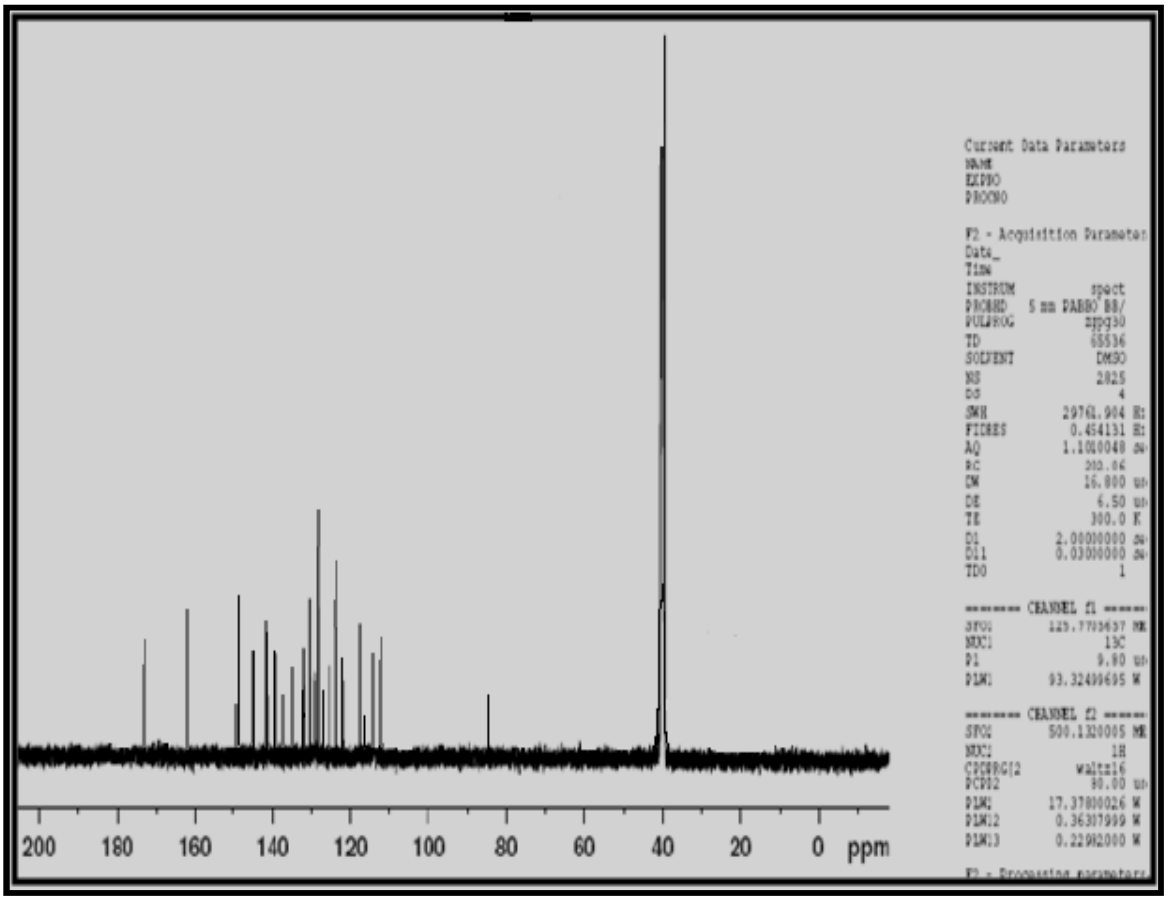


Fig (17): 13C.NMR of Compound [7]

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